

# Assessment of Behavioural Disorders in Children with Functional Constipation

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## Abstract

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**BACKGROUND:** Functional constipation (FC) is a common health problem in paediatrics that causes significant physical and emotional distress to patients and their families.

**AIM:** In the current work, we assessed the presence of behavioural problems in children with functional constipation and their pattern and relation to various demographic and disease-associated factors.

**METHODS:** A cross-sectional case-control study was conducted, including 55 consecutive children aged 4-16 years diagnosed with functional constipation and 55 healthy age and sex-matched controls. Psychological assessment was done using the Pediatric Symptom Checklist – 17 (PSC-17).

**RESULTS:** Twenty-six (47.3%) patients with FC had positive total PSC-17 scores while none of the controls had positive scores (p-value < 0.001). Positive internalising and externalising behaviours scores and attention problems were found in 36 (65.5%), 15 (27.3%) and 12 (21.8%) of the patients respectively in contrary to controls where only 6 (10.9%) had positive scores in internalising behaviour, and non-showed externalising behaviour and 4 (7.3%) were inattentive. Older age, longer duration of illness, residency in rural areas and presence of encopresis were found to have a significant association with the presence of such problems.

**CONCLUSION:** Children with FC have more behavioural disorders compared to healthy controls. Integration of psychosocial aspects and their management is recommended during dealing with patients with FC.

## Introduction

Constipation with or without encopresis is a common health problem in the pediatric age group with prevalence ranging from 0.7% to 29.6% [1], [2]. Functional constipation (FC) represents 95% of the cases of pediatric constipation; its aetiology, pathophysiology, and prognosis are still not fully understood [3], [4]. FC is often associated with infrequent and/or painful defecation, faecal incontinence and abdominal pain. This causes significant physical and emotional distress and concern for children and their families ultimately interfering with their health-related quality of life and causing an impact on health care cost [5], [6], [7]. Also, functional constipation may have a great effect on the psychological and behavioural aspects of children which might affect cognitive abilities and school performance of children. Whether behavioural problems caused by constipation or the reverse is still

under investigation [8].

This study aimed to assess the presence of behavioural problems in children with functional constipation in comparison to healthy children and to find out the pattern of these problems and their relation to various demographic and disease-associated factors.

## Methods

A cross-sectional case-control study was conducted on consecutive children aged 4-16 years diagnosed with functional constipation who presented to the pediatric gastroenterology outpatient clinic during the study duration. The diagnosis of FC was made according to ROME III criteria [9]; children aged 4 years or above who have insufficient criteria to

diagnose irritable bowel syndrome and have 2 or more criteria for at least 2 months were diagnosed to have FC. These criteria are 2 or fewer defecations in the toilet per week; at least 1 episode of encopresis (faecal incontinence) per week; history of passage of large diameter stools that may obstruct the toilet; history of hard/painful bowel movements; history of retentive posturing or excessive stool retention, and presence of a large faecal mass in the rectum.

A group of age and sex-matched apparently healthy children were selected as control; they were recruited from patient sibling to have the same socioeconomic status. Children with any organic causes (e.g. Hirschsprung disease, anorectal malformation, spinal cord abnormality) or concomitant chronic illnesses and those who received any behavioural treatment or complementary medicine were excluded from the study.

The study was approved by the medical ethics committee of the National Research Centre, Egypt approval no. 18065. Informed written consent was obtained from enrolled parents after explaining the study; assent was taken from older children whenever feasible.

### Psychological assessment

The psychosocial assessment was done using the *Pediatric Symptom Checklist-17* (PSC-17); a psychosocial screen designed to facilitate identification of cognitive, emotional and behavioural problems so that appropriate interventions can be initiated as early as possible. The PSC-17 consists of 17 items that are rated as "Never", "Sometimes" or "Often" present and scored "0", "1" and "2" respectively. The total score is calculated by adding together the score for each of the 17 items. Items that are left blank are ignored. If four or more items are left empty, the questionnaire is considered invalid. A PSC-17 score of 15 or more (positive score) indicates the occurrence of significant behavioural or emotional problems. PSC-17 consists of 3 subscales: internalising subscale; with a cutoff point of the positive score of 5 or more, externalising subscale; with a cutoff point of positivity of 7 or more and attention subscale; with a cutoff point of 7 or more [10], [11].

Statistical analysis was done using SPSS 16 software for Windows (SPSS Inc, Chicago, Ill), statistical significance was set at  $P < 0.05$ . Patients and control characteristics were described as the mean  $\pm$  standard deviation for continuous data. Categorical data as sociodemographic data and PSC-17 scores were presented as frequency ( $n\%$ ). Comparisons between patient and control groups were made using the chi-square test for categorical data and t-test or Mann-Whitney  $U$  for continuous data. Analysing correlation between total PSC-17 score and subtotal scores with patients' age and

duration of illness were done using Spearman correlation.

## Results

Fifty- five children with functional constipation were enrolled in this study; their ages ranged from 7.5 to 13 years, 33 (60%) were girls, and 22 (40%) were boys; their mean  $\pm$  SD duration of illness was  $2.73 \pm 1.5$  years. A group of 55 healthy age, sex and residency matched children were taken as control (Table 1).

**Table 1: Demographic characteristics of the studied groups**

Variable	Cases	Controls	P-value
Age/year (mean $\pm$ SD)	10.28 $\pm$ 2.72	9.97 $\pm$ 2.68	0.554
Sex (no. %)			
Male	22 (40.0%)	28 (50.9%)	0.251
Female	33 (60.0%)	27 (49.1%)	
Resident			
Rural	23 (41.8%)	30 (54.5%)	0.182
Urban	32 (58.2%)	25 (45.5%)	

A statistically significant difference was found between FC patients and controls in all domains of psychosocial behaviour (Table 2). Positive total scores of the PSC-17 was found in 26 patients (47.3%), but none of the controls had positive scores ( $p$ -value  $< 0.001$ ). Regarding the internalising behaviours, externalising behaviours and attention problems scores, positive scores were found in 36 (65.5%), 15 (27.3%) and 12 (21.8%) of the patients respectively in contrary to the controls where only 6 (10.9%) had positive scores in internalising behaviour, none showed externalising behaviour and 4 (7.3%) had positive score for attention problems.

**Table 2: Psychosocial behaviour in children with functional constipation and controls**

	Controls (N = 55)		Cases (N = 55)		$\chi^2$	P
	N	%	N	%		
Psychosocial behavior (total score)	0	0.0%	26	47.3%	34.048	$< 0.001$
Internalizing behavior	6	10.9%	36	65.5%	34.664	$< 0.001$
Externalizing behavior	0	0.0%	15	27.3%	17.368	$< 0.001$
Attention problems	4	7.3%	12	21.8%	4.681	0.031

Female patients were found to have more internalising behaviour, while males had more externalising behaviour. Living in rural areas was also associated with significantly higher total scores, internalising and attention problems.

Presence of encopresis affects PSC-17 total score significantly, internalising and attention scores while no significant effect was found regarding externalising behaviour (Table 3).

**Table 3: Relation between PSC-17 score and its sub-scores and patients` demographic and disease characteristics**

	Sex		P	Residency		P	Encopresis		P
	Male	Female		Urban	Rural		Yes	No	
PSC-17 Total score	14	15	0.531	13.0	15	< 0.001	13	15	< 0.001
Median (Range)	(7-18)	(7-18)		(7-15)	(12-18)		(7-18)	(12-18)	
Internalizing Behavior Score	5	6	0.016	4	6	0.003	5	7	0.006
Median (Range)	(3-7)	(3-9)		(3-7)	(3-9)		(3-7)	(3-9)	
Externalizing Behavior Score	6	4	< 0.001	4	4	0.938	4	4	0.210
Median (Range)	(3-7)	(1-7)		(2-7)	(1-7)		(2-7)	(1-7)	
Attention problems Score	4	4	0.178	3.0	6	< 0.001	3	6	< 0.001
Median (Range)	(1-8)	(1-8)		(1-5)	(1-8)		(1-5)	(1-8)	

The duration of illness was found to affect the psychosocial behaviour among children with FC. There were positive correlations between duration of illness and the total PSC-17 score ( $p < 0.001$ ,  $r: 0.561$ ), internalizing behavior score ( $p < 0.001$ ,  $r: 0.473$ ) and externalizing behavior score ( $p: 0.024$ ,  $r: 0.473$ ) (Figure 1; A, B, and C), while attention problems score was not correlated with the duration of illness ( $p: 0.024$ ,  $r: 0.171$ ).

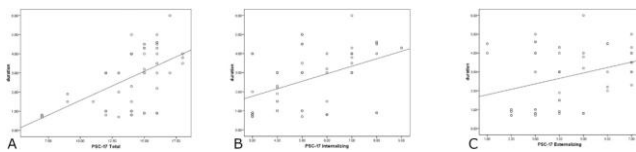


Figure 1: Correlation between the duration of illness and the total PSC-17 score (A); internalising score (B) and externalising score (C) in children with FC

Also, we found that the older the patient, the more behavioural problems they have. This was applicable for the total PSC-17 score ( $p < 0.001$ ,  $r: 0.659$ ), internalizing score ( $p < 0.001$ ,  $r: 0.489$ ) and externalizing score ( $p: 0.007$ ,  $r: 0.359$ ) (Figure 2; A, B, and C), but not to attention problems score ( $p: 0.076$ ,  $r: 0.241$ ).

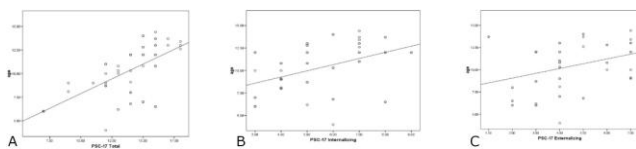


Figure 2: Correlation between the age of the patients and the total PSC-17 score (A); internalising score (B) and externalising score (C) in children with FC

## Discussion

This study assessed the presence of psychosocial behaviour problems in children with functional constipation in comparison to healthy control and the correlation of such problems with the patients` different demographic and disease-related factors. We found a statistically significant difference between FC patients and controls in all domains of psychosocial behaviour; positive total scores of the PSC-17 was found in 47.3% of cases while none of the controls had positive scores. The internalising and

externalising behaviours were more prevalent among patients with FC than the inattentive behaviour. In agreement with our findings, Kiliincaslan et al., [12] in 2014 compared the behavioural score of 59 healthy children with normal bowel habits with 65 children with FC; they found that nearly half of children with FC had internalising problems and about one-third of them had externalising problems. Also, in a Dutch study, behaviour problems were found to be common in constipated children referred to gastrointestinal clinics with a prevalence rate of overall, internalising, and externalising behaviour problems of 36.8%, 36.1%, and 27.1% respectively. (13) In another study, Elkhayat and coworker reported higher Child Behavior Checklist (CBCL) scores in children with FC than controls in all items except for the attention and the aggressive parameters [14].

In our study, age was the only demographic factor that correlated with the positive total PSC-17 score, internalising and externalising behaviour. Internalising behaviour was more prevalent in girls, while externalising behaviour was more common in boys. Regarding the disease features, the duration of illness was significantly correlated with the positive total PSC-17 score, internalising and externalising behaviour but not with the attention problems. Encopresis was associated with a higher total score, internalising behaviours and attention problems but not externalising behaviours. In some of the previously conducted studies on children with FC, although externalising problems are not uncommon, yet they may be overlooked as the comprehensive behavioural management focus mainly on fear of defecation [15], [16].

In this study, we used the PSC-17 score as a tool for the assessment of psychosocial behaviour problems. The PSC-17 is an easy and reliable tool that helps providers of primary care to evaluate the probability of finding any mental health disorder in their patients and allows characterisation of these behavioural disorders [17].

The mechanism that relates to FC and behavioural problems is not known. Pathophysiology of FC in children is generally believed to be multifactorial with suggested relation between stress, the central brain activity, enteric nervous systems and anorectal dysfunction [18]. Formerly, it was suspected that constipation and encopresis happen secondary to underlying psychological problems, however, studies failed to prove such causal relation between psychological abnormalities and constipation in children [19]. Crosstalk exists between gut and brain through a complex communication system and has multiple effects on different behavioural aspects and higher cognitive functions [20]. Abnormalities in this brain-gut communication are one way that brain-gut axis disease may arise. Moreover, some evidence refers to the presence of common defects in developmental pathways of the central and enteric nervous systems that lead to brain-gut disorders [21],

[22].

On the other hand, behavioural problems in children with FC may be related to the effect of chronic illness. Any chronic illness has biological, social and behavioural impacts that affect the child psychosocial development and the family coping [17], [23], [24]; the risk of psychopathology is about 2.5 times higher in chronically ill children than in the general population. [25]. Some studies have shown that chronic constipation leads to behavioural abnormalities and interfere with family dynamics [12], [13].

In conclusion, children with FC have more behavioural disorders compared to healthy controls. Older age, longer duration of illness, residency in rural areas and presence of encopresis were found to have a significant association with the presence of such problems. Searching for, identification and management of behavioural problems should be considered in all children with FC.

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